# CREATE-IP and CREATE-V: Data and Services Update

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## Available Data

The NCCS has published data from seven atmosphere reanalysis projects, eight ocean reanalysis projects, four hourly surface temperatures, and GMAO aerosol forecasts.

| Atmosphere Reanalysis | Ocean Reanalysis | GMAO Aerosol Forecasts |
|---|---|---|
| NASA/MERRA | NOAA/NCEP CFSR | Total Aerosols |
| NASA/MERRA2 | CMCC/C-GLORSv5 | Black Carbon |
| ECMWF ERA-Interim | NOAA/GFDL ECDAv31 | CO Column |
| NOAA/NCEP CFSR | GECCO2 | CO2 Bulk Mixing Rate |
| NOAA/ESRL 20CRv2c | GODAS | Dust |
| JMA JRA-25 | MRI | Organic Carbon |
| JMA JRA-55 | ORAPS4 | Sulfates |
| Multiple Reanalysis Ensemble (MRE) | ORAP5 | Sea Salt |
| | ORA Ensemble | CFC-12 |
| | | Total Column Ozone |

| IAP-UA: Hourly Surface Temperature Reanalysis |
|---|
| NASA/MERRA |
| ECMWF/ERA-Interim |
| ECMWF/ERA-40 |
| NOAA/NCEP-NCAR |

The NCCS has generated two ensemble means and standard deviations, one for each of the atmosphere reanalyses (details below) and the ocean reanalyses.

The data can be found at:

esgf.nccs.nasa.gov (CREATE-IP)
dataserver.nccs.nasa.gov
cds-cv.nccs.nasa.gov/CREATE-V

## ABSTRACT

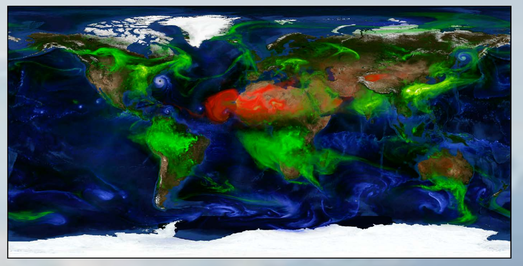
To reduce the time and effort required by scientists to download and reformat data from numerous data providers, the NCCS has partnered with atmospheric reanalysis centers (NASA, NOAA, EMCWF, and JMA) and the CLIVAR Global Synthesis and Observations Panel (GSOP) to reprocess atmosphere and ocean reanalyses into CMIP5-compliant format and made them available to scientists through ESGF and THREDDS. An atmosphere ensemble (Multiple Reanalysis Ensemble) has been generated and published. Hourly surface temperature combined with Climatic Research Unit datasets have been published in the Collaborative REAnalysis Technical Environment (CREATE) project in ESGF.

The NCCS developed CREATE-V, a web based visualization tool that allows scientists to explore variables, dates, and levels and to visualize the data side by side to identify features for future study. Aerosol forecast data from the Global Modeling and Assimilation Office (GMAO) has been added to CREATE-V. GIS services for reanalyses datasets are now coming online.

A server-side analytics tool, Earth Data Analytics Service (EDAS), utilizes Scala and Spark to provide the ability to process CREATE data using NCCS compute resources without downloading the data.

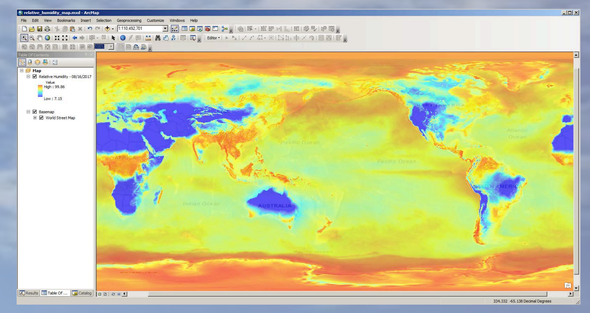
Discover Visualize Analyze

## CREATE-V GMAO Aerosols



cds-cv.nccs.nasa.gov/GMAO-V

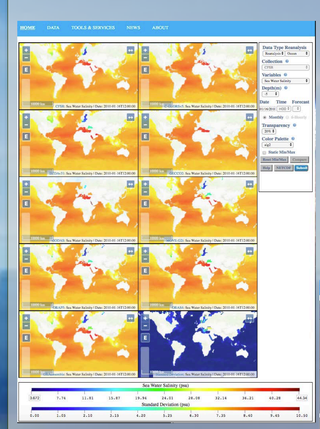
## ArcGIS



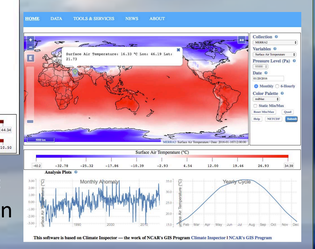
Relative humidity for August 2017 shows Hurricane Harvey in the Gulf of Mexico.

maps.nccs.nasa.gov

## CREATE-V Reanalyses



Temperature values can be selected to show the monthly anomaly and yearly cycle. The color map minimum and maximum can be set to highlight features of interest (below).



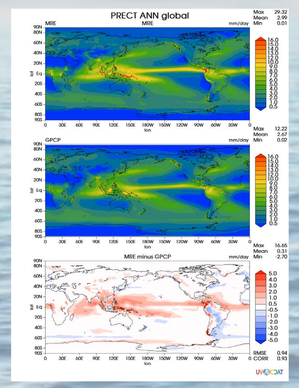
Ocean salinity, the ensemble mean, and standard deviation are shown above.

cds-cv.nccs.nasa.gov/CREATE-V

## Multiple Reanalysis Ensemble (MRE)

MRE is an ensemble of ERA-Interim, JRA-55, MERRA, MERRA2, and CFSR. Data from 1979 to 2016 is prepared by regridding to a common 1.25-degree x 1.25-degree grid and extracting 24 common pressure levels from the monthly means. Ensemble means files are then created from the regridded and extracted levels of the ensemble members.

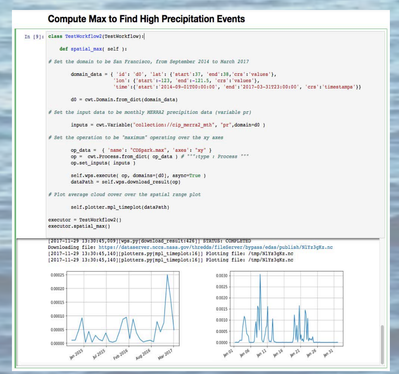
All data were published in CREATE-IP (ESGF), THREDDS, and CREATE-V.




Annual averaged GPCP precipitation comparison with the MRE.

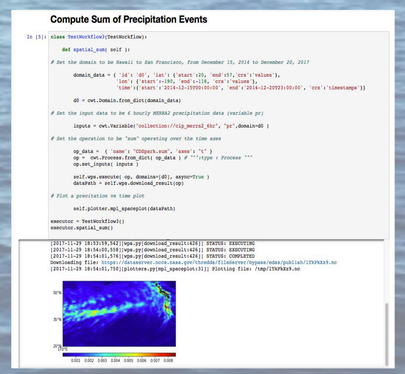
## Server-Side Analytics - Earth Data Analytics Service (EDAS)

EDAS provides access to a suite of "canonical operations"—min, max, sum, difference, average, root mean square, anomaly, and standard deviation—that researchers can combine to develop various workflows. These operations and datasets can be accessed via a Web Processing Service (WPS) API using applications written by the user. After downloading client software, users can execute operations on data stored at the NCCS using NCCS compute resources without needing NASA credentials.




nccs.nasa.gov/services/Analytics

The Jupyter Notebook on the left queries EDAS to find maximum monthly precipitation in San Francisco. A second run uses 6-hour data to identify January 2017 atmospheric rivers. On the right, a query finds the sum of precipitation during the December 2014 atmospheric river.




## Summary

CREATE provides access to atmosphere and ocean reanalysis datasets and ensembles through CREATE-IP on ESGF and the CREATE-V web interface. Selected atmosphere datasets are available through EDAS and ArcGIS, with more planned. It is anticipated that this collection of data, services, and science collaborations will support future work in reanalysis intercomparison and interdisciplinary science.

**For Additional Information**
https://cds.nccs.nasa.gov
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